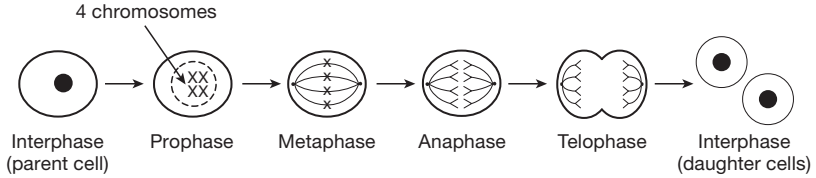


**PART A: Answer all questions in this part.**

*Directions:* For each statement or question, write on your separate answer sheet the number of the word or expression that best completes the statement or answers the question.

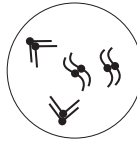
- 1 Hereditary information is stored inside the
  - (1) ribosomes, which have chromosomes that contain many genes
  - (2) ribosomes, which have genes that contain many chromosomes
  - (3) nucleus, which has chromosomes that contain many genes
  - (4) nucleus, which has genes that contain many chromosomes
- 2 Which sequence of terms represents a decrease from the greatest number of structures to the least number of structures present in a cell?
  - (1) nucleus → gene → chromosome
  - (2) gene → nucleus → chromosome
  - (3) gene → chromosome → nucleus
  - (4) chromosome → gene → nucleus
- 3 Which statements best describe the relationship between the terms chromosomes, genes, and nuclei?
  - (1) Chromosomes are found on genes. Genes are found in nuclei.
  - (2) Chromosomes are found in nuclei. Nuclei are found in genes.
  - (3) Genes are found on chromosomes. Chromosomes are found in nuclei.
  - (4) Genes are found in nuclei. Nuclei are found in chromosomes.
- 4 Which of the following is a reason that the size of a cell is limited?
  - (1) Larger cells are easier for an organism to produce than smaller cells.
  - (2) The cell's ability to exchange substances is limited by its surface area-to-volume ratio.
  - (3) The larger the cell becomes, the easier it is for substances to reach where they are needed.
  - (4) The size of a cell has no relationship to the cell's function in a multicellular organism.
- 5 What factors can cause cells to divide in a culture medium?
  - (1) protein signals
  - (2) lack of nutrients
  - (3) contact with other cells
  - (4) contact with the edge of the dish
- 6 What is the importance of feedback signals at key checkpoints within the cell cycle?
  - (1) to indicate the end of the cycle
  - (2) to indicate the presence of proteins
  - (3) to identify the meiosis and mitosis indicators
  - (4) to delay or trigger the next phase of the cycle
- 7 What is a gene?
  - (1) a large molecule of chromosomes
  - (2) a protein that directs the activity of a cell
  - (3) a segment of DNA that codes for RNA and protein
  - (4) a segment of RNA that moves from the nucleus to the cytoplasm
- 8 What might happen if cytokinesis were omitted from the cell cycle?
  - (1) The daughter cells would die.
  - (2) The cell would lose its mitochondria.
  - (3) The daughter cells would not have nuclei.
  - (4) The cell would not divide into two daughter cells.
- 9 Mitosis could not proceed if a mutation interrupted the assembly of the
  - (1) cell wall.
  - (2) spindle fibers.
  - (3) cell membrane.
  - (4) nuclear envelope.

**10** The diagram below illustrates the process of cell division. What is the significance of anaphase in this process?

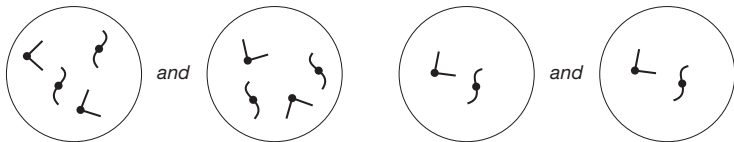


- (1) Anaphase usually ensures that each daughter cell has the same number of chromosomes as the parent cell.
- (2) Anaphase usually ensures that each daughter cell has twice as many chromosomes as the parent cell.
- (3) In anaphase, the cell splits in half.
- (4) In anaphase, the DNA is being replicated.

**The chromosome content of a skin cell that is about to form two new skin cells is represented in the diagram below.**

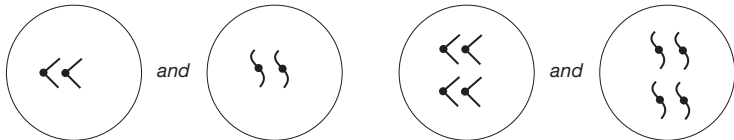


**11** Which diagram best represents the chromosomes that would be found in the two new skin cells produced as a result of this process?



(1)

(3)



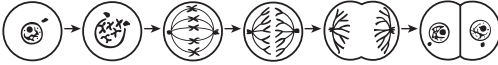
(2)

(4)

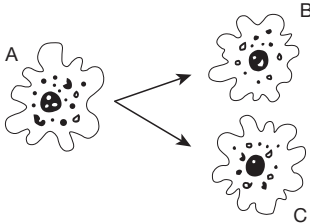


## PART B

- 12 Which activity most directly involves the process represented in the diagram below?



- (1) a gamete reproducing sexually
  - (2) a white blood cell engulfing bacteria
  - (3) a zygote being produced in an ovary
  - (4) an animal repairing damaged tissue
- 13 The diagram below represents single-celled organism A dividing by mitosis to form cells B and C. Cells A, B, and C all produced protein X. What can best be inferred from this observation?



- (1) Protein X is found in all organisms.
  - (2) The gene for protein X is found in single celled organisms, only.
  - (3) Cells A, B, and C ingested food containing the gene to produce protein X.
  - (4) The gene to produce protein X was passed from cell A to cells B and C.
- 14 Arrange the following structures from largest to smallest.

a chromosome

a nucleus

a gene

Largest



Smallest